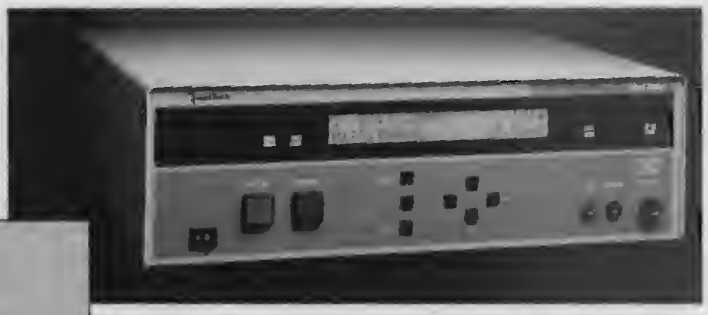
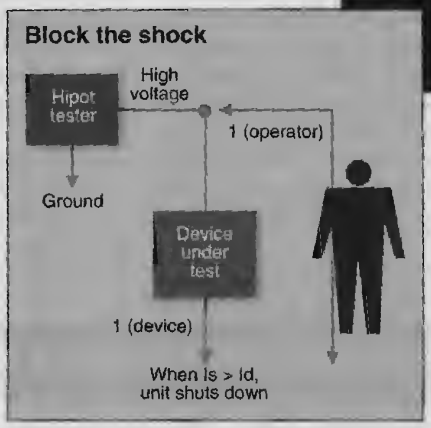
Ground-fault interrupt blocks the shock

GFI monitors current for imbalance, shuts down voltage quickly if one occurs

John Lewis, Northeast Technical Editor



To protect operators from inadvertent high-voltage contact, the Guardian 2500 Series' GFI constantly monitors for a current imbalance.



In the real world, current from the source, I(source) always exceeds I(device) slightly due to stray leakage paths between the device, test leads and ground. But the difference between I(source) and I(device) increases if the operator makes contact with the high voltage output, and is easily detected.

Marlborough, MA— Electrical products and devices use insulation material to separate the nonhazardous, user-accessible parts from the hazardous current-carrying parts. The insulation forms a dielectric barrier that isolates the leads or components carrying electrical current from any conducting material that the user might come in contact with.

Manufacturers perform a dielectric strength test (Hipot test) to measure the insulating material's ability to hold up against high voltage and keep users safe. Typically, a Hipot test applies a voltage, much higher than normal operating voltage, across the insulation barrier and monitors current flow for breakdown. UL, CSA, EN, and IEC are a few of the standards that define these tests for particular product types. While Hipot tests ensure the device is safe for the end user, they do nothing to protect the test operators, who must exercise great care to prevent inadvertent contact with typical test voltages of 1,000 to 3,000V.

While common safeguards such as remote control and safety interlocks have helped minimize the danger to test equipment operators, a substantial number are still injured each year, according to QuadTech Marketing Engineer Jim Richards. By implementing Ground Fault Interrupt (GFI) technology into QuadTech's Guardian 2500 Series Hipot tester, the company's engineering design team has taken a giant step toward operator safety. GFI constantly monitors for a current imbalance, and shuts down voltage quickly if one occurs.

While the electrical code for new construction specifies GFI technology for electrical outlets near kitchen sinks and in bathrooms, the technology works only for ac circuits. It automatically interrupts power when ground current greater than 0.5 mA exists for a few milliseconds, and has saved countless people from electrical shock in the home. Just as a hair dryer shuts down to protect the user, the 2500 shuts down to protect its operator. "Our biggest challenge, however, was to provide GFI for a wide range (up to 5,000V ac or up to 6,000V dc), and not interfere with the operation of the tester," says QuadTech's Engineering Manager Ron Roetzer.

QuadTech's patent-pending innovation measures the current exiting the instrument's high-voltage output separately from the current flowing through the device under test. "If the output current from the tester exceeds the current to the device under test, it must be going somewhere," says Roetzer. "If the current going astray is sufficient, and all of it happens to flow through the operator's body, it would result in a severe electrical shock."

GFI continuously looks for a current imbalance, and shuts down voltage quickly when it occurs. "Doing this in 1 or 2 milliseconds is much faster than a person could normally react," explains Roetzer. "And that's exactly how the Guardian 2500's GFI performs." dn

Additional details...Contact James Richards, QuadTech Inc., 100 Nickerson Rd., Marlborough, MA 01752; (508) 485-3500; or Circle 505

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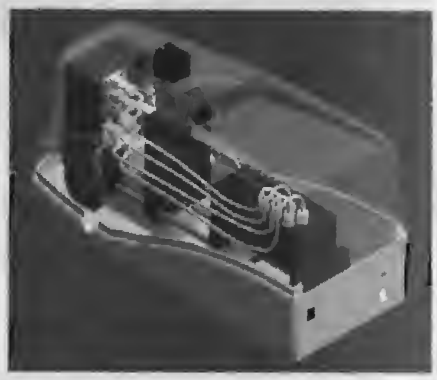
Machine speeds pneumatic tube assembly

Inserts plastic fittings in air hoses ten times faster than manual techniques

Charles J. Murray, Senior Regional Editor



The TubeSetter's clamping head (at left) is powered by air from valves in the manifold (at right). Fittings are dropped into place through a track on the machine's magazine (middle).

Fort Collins, CO—For decades, electrical manufacturers have known how to simplify large, complicated systems: Assemble wiring harnesses remotely, then plug them into big components later in the assembly process.

Now, one manufacturer has found a way to apply the same thinking to pneumatic components. Value Plastics, a manufacturer of pneumatic fittings, has developed a system that enables users to assemble hoses and fittings as if they were electrical wiring harnesses.

For users, the new system could save countless manufacturing hours. By some estimates, users plug more than 100 million barbed fittings into hoses every year. Engineers from Value Plastics believe they could dramatically cut the assembly time of the overwhelming majority of those 100 million hose-and-fitting assemblies.

The company's system consists of two key parts: an assembly machine that automatically plugs barbed plastic fittings into air hoses; and a quick disconnect technique that enables users to employ straight-through fittings, which can be assembled remotely, then plugged into place later in the assembly process. The two are complementary: The machine helps assemble fittings quickly; and the straight fittings allow a machine to be used for assembly (in contrast, T-shaped, Y-shaped, or L-shaped fittings could not be placed in hoses by automated techniques).

Developed by Value Plastics engineers, the tube setting machine grabs the straight fittings from a feeding track and inserts them inside plastic tubing, which is fed by a